

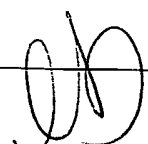


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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------------------|------------------|
| 10/065,208 | 09/25/2002 | Hsiang-Lan Lung | JCLA7578 | 8168 |
| 23900 | 7590 | 10/05/2004 | | |
| J C PATENTS, INC. 4 VENTURE, SUITE 250 IRVINE, CA 92618 | | | | |
| | | | EXAMINER ANDERSON, MATTHEW A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1765 | |
| DATE MAILED: 10/05/2004 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|---------------------------------|-----------------------------|---|
| Office Action Summary | Application No. 10/065,208 | Applicant(s) LUNG ET AL. | |
| | Examiner Matthew A. Anderson | Art Unit 1765 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tungare et al. (US 6,594, 414) in view of Kato et al. (US 6,326,216).

Tungare et al. discloses a method of forming an epitaxial layer on a substrate. A lower buffer layer is used over a substrate which compensates and dissipates strain and permits the growth of high quality monocrystalline oxide accommodating layer. The accommodating buffer layer is lattice matched to the

overlying piezoelectric monocrystalline material layer. (abstract) In respect to Fig. 31, the buffer layer is disclosed as barium titanate. The deposition of epitaxial monocrystalline conductive oxide thereon is disclosed in a larger electronic device. (see col. 24 line 20+). The layer designated (513) is described in col. 24 lines 48-56 as sputter deposited monocrystalline metal oxides.

Lanthanum nickel oxide is disclosed as an alternative material for this layer in col. 26 lines 30-37. On the conductive metal oxide layer is formed a piezoelectric layer (504) of PZT (lead zirconate titanate) which can be deposited by sol gel techniques. Tungare et al. discloses a piezoelectric device.

Tungare et al. does not disclose the growth of PZT on LNO by an in situ method (e.g. sputtering both LNO and PZT) such that the PZT takes the lattice structure of the LNO at a temperature of about 350-500°C.

Kato et al discloses the growth of PZT by sputtering methods. In Fig. 17 PZT is disclosed as a perovskite material. Addition of lead oxide into the sputtering target of PZT is disclosed in col. 11 lines 30-41. Argon gas atmosphere is suggested in col. 10 line 50-55. PZT is disclosed as useful in DRAM or Ferroelectric RAM. (abstract). Temperature is described as 500-800 anneal after sputtering in col. 12 lines 30-40. Lower temperatures were also known in the art to produce PZT films such as 400 to 700°C in col. 2 lines 10-15.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to modify the disclosure of Tungare et al. with Kato et al's. PZT sputtering method because PZT was known by Kato et al. to be deposited by sputtering. Motivation was given in Kato et al. in that the PZT obtained

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contributed to the production yields of the device into which it was integrated.
(col. 13 –14 lines 40+ and 1-5, respectively).

In respect to claims 1,12 it would have been obvious to one of ordinary skill in the art at the time of the present invention to form an epitaxial PZT on a substrate having a barrier layer and a LNO thin film as a bottom electrode by an in situ process such that the PZT takes the lattice structure of the LNO film since sputtering growth of both LNO and PZT was known and Tungare et al. discloses epitaxial growth of PZT on LNO.

In respect to claims 1-3, 12, 17-18, it would have been obvious to one of ordinary skill in the art at the time of the present invention optimize the growth temperature of the thin films because Kato et al. suggests a range of from 400 to 800°C for annealing sputtered thin films.

In respect to claim 4, 19 it would have been obvious to one of ordinary skill in the art at the time of the present invention to use a sputtering target with excess Pb (i.e. one with a $y > 1$ as in the formula) because Kato et al. discloses such as useful for countering the effect of Pb re-evaporation in col. 2 lines 30-40.

In respect to claims 5-6, 20 it would have been obvious to one of ordinary skill in the art at the time of the present invention to grow the PZT under an argon atmosphere of about 1-50 mTorr because such conditions were used by Kato et al. (col. 10 lines 55-65).

In respect to claims 7-10, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the method to fabricate

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these electrical devices because they were suggest by the Kato et al. and Tungare et al.

In respect to claims 11, 21 it would have been obvious to one of ordinary skill in the art at the time of the present invention to PZT with a lattice structure of a perovskite phase since Kato et al. discloses PZT as a perovskite.

In respect to claim 13, it would have been obvious to one of ordinary skill in the art at the time of the present invention to include CMOS structures in the substrate because CMOS structures were suggested Tungare et al. in col. 6 lines 35-40.

In respect to claim 14 , it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a interconnect structure and a inter-metallic dielectric because such is shown in Fig. 31.

In respect to claim 15, it would have been obvious to one of ordinary skill in the art at the time of the present invention been obvious to select the barrier layer as an nitride since such is suggested in col. 4 lines 15-25.

In respect to claim 16, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form an upper electrode with LNO because such an upper electrode is shown in Fig. 31 as layer (511).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone

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number is (571) 272-1459. The examiner can normally be reached on M-Th, 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAA
September 30, 2004

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER

